Scientists fertilise mouse eggs without sperm

Deborah Josefson *San Francisco*

Dr Lacham-Kaplan's work in Melbourne could help infertile men

Australian researchers have devised a method of fertilising eggs without sperm. Dr Orly Lacham-Kaplan's research unit at the Monash University's Institute of Reproduction and Development in Melbourne developed the procedure with the hopes that it could one day serve as a viable alternative to sperm donation for infertile men.

Theoretically, it may also be used to produce biological children for homosexual partners of either sex. The technique relies on somatic cell transfer and is a modification of current cloning technology.

Somatic nuclear cell transfer, the process of transferring a cell from any part of the body into an oocyte nucleus, was used in cloning Dolly the sheep. Oocytes and sperm are haploid, with one set of chromosomes, whereas somatic cells are diploid, with two chromosomal sets. Dolly was created by transferring a full set of chromosomes from an adult somatic cell into an oocyte that had been stripped of its own genetic material.

By contrast, in the method used by the researchers at Monash, the oocyte retains its chromosomes but the somatic cell is persuaded, via chemical means, to jettison one set of its own after fertilisation. The resulting fertilised egg ends up with two sets of chromosomes, one set from the mother and the second from the adult cell. The resultant "fertilised" egg is prompted to divide through electric shock stimulation.

So far, the group has fertilised oocytes from mice with an adult cell from a female mouse and allowed the resultant embryos to develop in culture to the blastocyst stage. A mouse needs 21 days of gestation for full development. In culture these mouse embryos have grown to day 5 without an outward sign of abnormality.

The researchers plan to implant the embryos into surrogate mouse mothers for further development. They have yet to determine whether genetically normal mouse pups with full reproductive capability would result. It should take at least a year to determine if normal mice will develop.

Although the work is in its preliminary stages, it represents an advance in the field of reproductive genetics. For infertile couples or same sex couples who want children with a genetic contribution from each partner, it provides hope. □

Embryos created for stem cell research

Deborah Josefson *San Francisco*

Researchers from the Jones Institute, a private infertility clinic in Virginia, United States, have disclosed that they have created human embryos for the explicit purpose of harvesting them for stem cells (*Fertility and Sterility* 2001;76:125-31). The embryos were then destroyed.

This move marks the first known time that egg and sperm donors have been recruited specifically to produce embryos for stem cell harvesting. This runs counter to current recommendations from the National Bioethics Advisory Commission, the National Institutes of Health, and the ethics advisory board of the European Commission.

Previously, stem cells derived from human embryos were harvested from "left over" frozen embryos created by in vitro fertilisation (IVF) for sterile couples.

The creation of human embryos for stem cell research comes at a politically sensitive time, as President Bush is currently considering whether to allocate federal funds to stem cell research.

Susan Lanzendorf, Gary Hodgen, and colleagues at the Jones Institute and the Eastern Virginia Medical School, recruited 12 women and two men to provide the eggs and sperm for embryos destined for stem cell harvesting.

The donors signed detailed informed consent forms which explained that their resultant embryos would be harvested at the blastocyst stage (day 4 or 5 after fertilisation) for stem cells and would not be allowed to develop into fetuses.

Altogether, 162 oocytes from 12 women were extracted and inseminated with thawed donor sperm collected from two men. The women were paid $1500-2000 (£1000-1500) each for the egg donations. After insemination, 110 of the oocytes were successfully fertilised, and 40 developed to the blastocyst stage. The inner cell masses of the blastocysts were removed via immunosurgery and were cultured to yield three healthy embryonic stem cell lines.

Thomas Murray, a member of the Hastings Institute and the National Bioethics Advisory Committee, said: "There is a more than ample supply of embryos already created and destined to be destroyed. So long as there is such a supply available, there is no good reason to create an embryo solely for research."

Scientists at the Jones Institute said that they consulted an ethics committee composed of members of the clergy, lawyers, patients, and researchers and concluded that their approach was as ethical as using spare frozen embryos from IVF.

Their panel found that there were ethical advantages in recruiting donors who had no reproductive intentions and knew that their sperm and eggs would be mated for stem cells, rather than in using couples having IVF treatment who wanted their embryos to develop into babies.

The announcement drew immediate criticism from religious conservatives opposed to embryo research and from stem cell proponents, who felt that the Jones Institute approach would set back efforts to gain federal funding for stem cell work.

President Bush is expected to decide soon whether taxpayers' money should be devoted to embryonic stem cell research. □

The potential of stem cells

Stem cells are "master cells" that have the potential to develop into virtually every type of cell in the body. In the right conditions they can be encouraged to develop, for example, into nerve cells, cardiac cells, and even brain cells. These can then be used to understand disease mechanisms and to develop new treatments. Stem cells are generally obtained from embryonic tissue but can also be obtained from adults—for example, adult bone marrow cells can be manipulated to develop into liver cells. So far, functional cardiomyocytes and neurons have been produced from embryonic stem cells.